AMENDMENTS TO THE CLAIMS

Please amend Claims 3 and 5-11 as follows.

1. (Original) A tire deformation calculating method for calculating a deformation of a tire which is rotating on a road surface, the method comprising:

an acquiring step for acquiring measurement data of acceleration at a predetermined portion of the rotating tire for a duration corresponding to at least one round of tire rotation;

a signal processing step for extracting, from the acquired measurement data of acceleration, time series data of acceleration due to tire deformation; and

a deformation calculating step for subjecting the time series data of acceleration due to tire deformation to a time integration of second order to obtain displacement data so as to calculate the deformation at the predetermined portion of the tire.

2. (Original) The tire deformation calculating method according to Claim 1, wherein in the acquiring step the acceleration at a tread portion of the tire is acquired, and in the deformation calculating step the deformation at the tread portion of the tire is calculated.

3. (Currently amended) The tire deformation calculating method according to Claim 2, wherein:

a region on the tire circumference at the tire tread portion is divided into a first region including a contact region in contact with the road surface, and a second region including other than the first region;

in the signal processing step the measurement data of acceleration in the second region is approximated to calculate a first approximation curve defined on the first and second regions, and subtracts the first approximation curve from a waveform of the acceleration acquired in the acquiring step to extract time series data of acceleration due to tire deformation in the first and second regions;

on the other hand, a region on the tire circumference at the tire tread portion is divided into a third region including a contact region in contact with the road surface, and a fourth region including other than the third region; and

the deformation calculating step approximates the displacement data in the fourth region to calculate a second approximation curve defined on the ~~first~~ third and ~~second~~ fourth regions, and subtracts the second approximation curve from a waveform of the displacement data so as to calculate the deformation of the tire.

4. (Original) The tire deformation calculating method according to Claim 3, wherein the first approximation curve is obtained by providing a plurality of nodes in the second region, and by approximating the measurement data of acceleration in the first region in addition to the second region.

5. (Currently amended) The tire deformation calculating method according to Claim 3 ~~or 4~~, wherein the first approximation curve is calculated by applying weighting coefficients to the time series data of acceleration in the first region and to the time series data of acceleration in the second region; and a greater weighting coefficient is applied to the time series data of acceleration in the second region than a weighting coefficient applied to the time series data of acceleration in the first region to approximate the time series data of acceleration in the first and second regions.

6. (Currently amended) The tire deformation calculating method according to ~~any one of~~ Claims 3 ~~to 5~~, wherein the second region has an angle in a circumferential direction of at least 60 degree in an absolute value, the angle defined relative to a center position of the contact region of the tire.

7. (Currently amended) The tire deformation calculating method according to ~~any one of~~ Claims 3 ~~to 6~~, wherein the second approximation curve is obtained by providing a plurality of nodes in the fourth region, and by approximating the displacement data in the third region in addition to the fourth region.

8. (Currently amended) The tire deformation calculating method according to Claim 3 ~~or 7~~ ,

wherein the second approximation curve is calculated using a least squares method by applying weighting coefficients to the displacement data in the third region and to the displacement data in the fourth region, and a greater weighting coefficient is applied to the displacement data in the fourth region than a weighting coefficient applied to the displacement data in the third region to approximate the displacement data in the third and fourth regions.

9. (Currently amended) The tire deformation calculating method according to ~~any one of~~ Claims 2 ~~to 8~~, wherein the measurement data of acceleration is acquired by an acceleration sensor that is arranged in the tire tread portion.

10. (Currently amended) The tire deformation calculating method according to ~~any one of~~ Claims 1 ~~to 9~~, wherein the measurement data of acceleration is at least one of acceleration data in a radial direction perpendicular to a circumferential direction of the tire, acceleration data in the circumferential direction of the tire, and acceleration data in a width direction of the tire.

11. (Currently amended) The tire deformation calculating method according to ~~any one of~~ Claims 1 ~~to 10~~, wherein the measurement data of acceleration includes the acceleration data in a radial direction perpendicular to a circumferential direction of the tire, or includes, in addition to the acceleration data in the radial direction, the acceleration data in the circumferential direction of the tire; the deformation of the tire is the deformation at the tread portion of the tire in the radial and circumferential directions, or the deformation in the radial direction; and from the deformation, the contact length of the tire during rotation is calculated.

12. (Original) The tire deformation calculating method according to Claim 11, wherein if the measurement data of acceleration is the acceleration data in the radial direction perpendicular to the circumferential direction of the tire, the contact length is calculated by determining two positions at which the time series data of acceleration due to tire deformation crosses an acceleration of 0, and by using the two positions as positions corresponding to a leading edge and a trailing edge of the contact region of the tire.

13. (Original) The tire deformation calculating method according to Claim 12, wherein the time series data of acceleration due to tire deformation to be used for calculating the contact length is obtained by subjecting the deformation calculated in the deformation calculating step to a differentiation of second order with respect to time.

14. (Original) The tire deformation calculating method according to Claim 11, wherein the contact length is calculated by obtaining a deformation shape of the tire from the displacement data obtained in the deformation calculating step and by assuming positions at which the deformation shape crosses a line which is a certain distance away from a lowest point of the tire toward upward direction of the tire as a leading edge and a trailing edge of the contact region of the tire.

15. (Original) A tire deformation calculating apparatus for calculating a deformation of a tire which is rotating on a road surface, the apparatus comprising:

an acquiring unit for acquiring measurement data of acceleration at a predetermined portion of the rotating tire for a duration corresponding to at least one round of tire rotation;

a signal processing unit for extracting, from the acquired measurement data of acceleration, time series data of acceleration due to tire deformation; and

a deformation calculating unit for subjecting the time series data of acceleration due to tire deformation to a time integration of second order to obtain displacement data so as to calculate the deformation at the predetermined portion of the tire.